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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/655,221	09/05/2003	Yun Bok Lee	0465-1023P	6996
2292	7590	03/10/2006	EXAMINER	
BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			QI, ZHI QIANG	
			ART UNIT	PAPER NUMBER
			2871	

DATE MAILED: 03/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

8/1

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/655,221	LEE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Mike Qi	2871	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 October 2005 and 25 January 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21-23 is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-17, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 6 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on Jan.25, 2006 has been entered.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 5, 7-11,13-14,16 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,650,390 B2 (Sakamoto et al) in view of US 6,822,723 B2 (Song et al) and US 6,897,928 B2 (Jang-Kun).

Regarding claims 1 and 10, Sakamoto discloses (col.6, line 24 – col.7, line 19; Fig.4) that a multi-domain liquid crystal display device comprising:

- first and second substrates (411, 431) being opposite to each other;
- color filter layer (418) having an opening on the first substrate (411) (the opening is a gap between the two color filters such as red color filter, green color filter and blue color filter);

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- an insulating layer (420) (the first flattening film 420) formed of acrylic (see col.8, lines 46-53; Fig.7) that is an insulating material, so that the first flattening film (420) functions as an insulating layer on the first substrate (411) including the color filter (418), and further the passivation layer (417) also is an insulating layer;
- pixel electrode (421) (the control electrode 421) is a conductive film (col.8, lines 58-60) and connected to the source electrode (415) through a contact hole (422), so that the control electrode (415) functions as pixel electrode and formed on the first substrate (411) including the insulating layer (420);
- first alignment film (see col.7, lines 5-7) is deposited on the second flattening film (423), and that also is on the first flattening film (420) (i.e., an alignment film formed on the insulating layer);
- second alignment film (see col.7, lines 8-15) is deposited on the opposite electrode (common electrode 432), and that also is formed on the second substrate (431);
- liquid crystal layer (45) between the first and second substrate (411, 431).

Sakamoto does not explicitly disclose that a protrusion on the second substrate and corresponding to the opening of the color filter.

**Song** discloses (col.3, line 11-53; Fig.2) that a protrusion (31) is formed on a substrate (11), and each color filter (71) has a groove (711) (opening 711), and the protrusion (31) is corresponding to the opening pattern (711), and alignment layers formed on the common electrode (81) and the pixel electrodes (21) respectively, so that

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the alignment film is also formed on the substrate including the protrusion (31). Song further discloses (col.2, lines 26-28) that forming color filters either at the first substrate or at the second substrate, such that each color filter has a groove (such as opening 711) corresponding to the protrusion. The protrusion (such as 31) formed on common electrode would be an obvious variation. Song indicates (col.3, lines 48-50; Fig.2) that the protrusion (31) formed on the opening pattern (211) corresponding to the groove (opening) between the color filters (71) makes it easy to align the liquid crystal molecules (911) as partitioned. Song also indicates (col1, lines 48-50) that such liquid crystal display achieves a wide viewing angle in simplified processing steps.

As evidence, **Jang-kun** teaches (col.1, lines 42 – 48) that an opening pattern is formed at the pixel electrode (means opening pattern formed on the lower substrate), while a protrusion is formed at the common electrode (means protrusion pattern formed on the upper substrate) so as to form fringe fields due to the opening pattern and the protrusion, and the inclining direction of the liquid crystal molecules is controlled by way of the fringe field, thereby partitioning the pixel region into a plurality of micro-domains to obtain a wide viewing angle (see col.1, lines 22-28). Therefore, the protrusion formed on common electrode (on the upper substrate) would be an obvious variation.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to modify the liquid crystal display of Sakamoto with the teachings of the protrusion on a substrate corresponding to the opening of the color filter (either at first substrate or at second substrate) as taught by Song and Jung-kun, since the skilled

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in the art would be motivated for easy to align the liquid crystal molecules partitioning the pixel region into a plurality of micro-domains so as to obtain a wide viewing angle.

Regarding claims 2, 8, 11 and 19, Sakamoto discloses (Fig.4) that the thin film transistor is formed between the first substrate (411) and the color filter (418), and the first flattening film (420) and the passivation film (417) function as the insulating layer. Sakamoto further discloses (col.7, lines 8-15) that alignment film is disposed on the second flattening film (423) (insulating film 423), and that is the TFT between the insulating film and the alignment layer (see Fig.4).

Regarding claims 5 and 13, Sakamoto discloses (col.7, lines 8-15; Fig.4) that the opposed electrode (common electrode 432) is formed on the entire surface of the second substrate (431), and then a second alignment film is deposited on the opposite electrode (common electrode 432), such that forming protrusion would be after forming the common electrode.

Regarding claims 7 and 16, Sakamoto discloses (col.8, lines 46-53; Fig.7C) that using acrylic (acrylic resin) to form the first flattening film (420) (insulating layer), i.e., using acrylic resin to form the insulating layer.

Regarding claims 9 and 20, Sakamoto, Song and Jang-kun teach the invention set forth above except for a black matrix layer between the second substrate and the common electrode.

Song further discloses (col.4, lines 16-23; Fig.4B) that a black matrix (61) is formed on a second substrate (51), and a common electrode (81) is formed on the black matrix (61), so that the black matrix (61) is between the second substrate (51) and the

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common electrode (81); and the material of the black matrix (61) is a metallic or opaque material. The metallic or opaque material shields the lights, so that such black matrix would prevent the light leakage and increasing the display contrast (such as the applicant admitted prior art indicated in background of the invention of the specification, paragraph 0021 and Fig.2, a black matrix layer 26 preventing light from leaking).

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to modify the liquid crystal display of Sakamoto, Song and Jung-kun with the teachings of the black matrix layer between substrate and common electrode as taught by Song, since the skilled in the art would be motivated for preventing the light leakage and improving the display contrast.

Regarding claim 14, Sakamoto discloses (col.9, lines 21-34) that a liquid crystal are poured into the space between the two substrates that is using injection method to fill the liquid crystal through a pouring hole (inject hole).

3. Claims 3-4,12 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakamoto, Song and Jung-kun as applied to claims 1-2, 5, 7-11,13-14,16 and 19-20 above, and further in view of US 6,583,837 (Fukumoto et al).

Regarding claims 3-4,12 and 17, Sakamoto, Song and Jang-kun teach the invention set forth above except for that the protrusion has a dielectric structure, and the protrusion is formed of acrylic resin, BCB or black resin; and the insulating layer is formed of acrylic resin, BCB, silicon nitride, silicon oxide or polyimide compound.

Song further discloses (col.3, lines 1-15;Fig.2) that the protrusion (31) is formed of silicon nitride or organic material (insulating material). Furthermore, Fukumoto

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discloses (col.5, lines 14-16; Fig.1) that using acrylic resin as the material of the protrusions (25,26,27). Because the dielectric structure is an insulating structure, and acrylic resin having insulating property, so that using acrylic resin as the material of the protrusion and the insulating layer for achieving the insulating effect.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to modify the liquid crystal display of Sakamoto, Song and Jang-kun with the teachings of using acrylic resin as the material of the protrusion and the insulating layer as taught by Fukumoto, since the skilled in the art would be motivated for using the material of acrylic resin having insulating property.

4. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakamoto, Song and Jang-kun as applied to claims 1-2, 5, 7-11,13-14,16 and 19-20 above, and further in view of US 5,263,888 (Ishihara et al).

Regarding claim 15, Sakamoto, Song and Jang-kun teach the invention set forth above except for using liquid crystal dropping method such as forming seal, dropping liquid crystal, forming spacer, bonding and hardening the seal pattern.

Ishihara discloses (col.4, lines 7-40; col.2, line 58 – col.3, line 51; Fig.3) that using dropping method to assembly a liquid crystal display panel wherein forming a sealing member on a substrate, dropping a liquid crystal material at a surface of a substrate, forming spacer for maintaining a uniform gap between the two substrates (see col.1, lines 30-32), superposing one substrate upon another substrate (bonding the two substrates), and hardening the sealing member by irradiation with ultra-violet light. Ishihara indicates (col.1, line 49 – col.2, line 2) that using dropping method to fill the



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space between the two substrates with liquid crystal requires a short time, i.e., performing the assembly of the liquid crystal display panel is in a short time.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to modify the liquid crystal display manufacturing method of Sakamoto, Song and Jang-kun with the teachings of the dropping method as taught by Ishihara, since the skilled in the art would be motivated for using dropping method to fill the space between the two substrates with liquid crystal requires a short time (col.1, line 49 – col.2, line 2), i.e., fast to fill the liquid crystal.

***Allowable Subject Matter***

6. Claims 21-23 are allowed.
7. Claims 6 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
8. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record neither anticipated nor rendered obvious that a multi-domain liquid crystal display and a manufacturing method of a multi-domain liquid crystal display comprises various elements and steps, more specifically, as the following features:

the opening (in the color filter) on the first (lower) substrate has a pinwheel-shape as shown in Fig.5 [claims 6, 18 and 21-23].

### ***Response to Arguments***

5. Applicant's arguments filed on Oct. 26, 2005 have been fully considered but they are not persuasive.

1) The reference Song is relied on to teach (col.3, line 11-53; Fig.2) that a protrusion (31) is formed on a substrate (11), and each color filter (71) has a groove (711) (opening 711), and the protrusion (31) is corresponding to the opening pattern (711). Song further teaches (col.2, lines 26-28) that forming color filters either at the first substrate or at the second substrate, such that each color filter has a groove (such as opening 711) corresponding to the protrusion. The protrusion (such as 31) formed on common electrode would be an obvious variation.

2) As evidence, the reference Jung-kun teaches (col.1, lines 42 – 48) that an opening pattern is formed at the pixel electrode (means opening pattern formed on the lower substrate), while a protrusion is formed at the common electrode (means protrusion pattern formed on the upper substrate) so as to form fringe fields due to the opening pattern and the protrusion, and the inclining direction of the liquid crystal molecules is controlled by way of the fringe field, thereby partitioning the pixel region into a plurality of micro-domains to obtain a wide viewing angle (see col.1, lines 22-28).

### ***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mike Qi whose telephone number is (571) 272-2299.

The examiner can normally be reached on M-T 8:00 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Mike Qi  
Patent Examiner  
February 20, 2006